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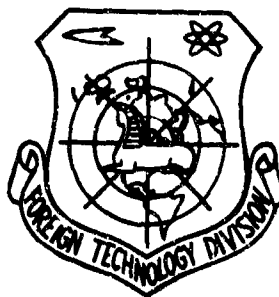
FOREIGN TECHNOLOGY DIVISION



MORNING OF THE SPACE ERA

by

Yu. Pobedkonostsev and G. Nesterenko



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FTD-MT-24-297-68

EDITED MACHINE TRANSLATION

MORNING OF THE SPACE ERA

By: Yu. Pobedonostsev and G. Nesterenko

English pages: 11

UR/0085-67-000-010

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FOREIGN TECHNOLOGY DIVISION
WP-APB, OHIO.

FTD-MT-24-297-68

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ACCESSION FOR		
REF ID	WAVE SECTION	<input checked="" type="checkbox"/>
DOC	DIFF SECTION	<input checked="" type="checkbox"/>
UNCLASSIFIED		<input type="checkbox"/>
JUSTIFICATION		
BY		
DISTRIBUTION/AVAILABILITY CODES		
GEN.	AVAIL. and/or	SPECIAL

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DATA HANDLING PAGE

01-ACCESSION NO. TP8501631		28-DOCUMENT LOC		39-TOPIC TAGS national security, propaganda	
09-TITLE MORNING OF THE SPACE ERA					
47-SUBJECT AREA 05					
42-AUTHOR/CO-AUTHORS POBEDKONOSTSEV, YU.; 16-NESTERENKO, G.				10-DATE OF INFO -----67	
43-SOURCE DRYL'YA RODINY (RUSSIAN)				68-DOCUMENT NO. FTD-MT-24-297-68	
				69-PROJECT NO. 60504	
63-SECURITY AND DOWNGRADING INFORMATION UNCL, 0			64-CONTROL MARKINGS NONE		97-HEADER CLASN UNCL
76-REEL/FRAME NO. 1886 1082	77-SUPERSEDES	78-CHANGES	40-GEOGRAPHICAL AREA UR	NO. OF PAGES 11	
CONTRACT NO.	1 REF ACC. NO. 65-	PUBLISHING DATE 94-00	TYPE PRODUCT Translation	REVISION FREQ NONE	
STEP NO. 02-UR/0085/67/000/010/0014/0017			ACCESSION NO.		
ABSTRACT The authors: Pobedkonostsey and Nesterenko review with propagandistic eloquence the achievements of the Soviet people in the study and mastery of space, beginning with the contributions of K. E. Tsiolkovsky, and continuing to the "walk in space" made by Aleksey Leonov in 1965.					

U. S. BOARD ON GEOGRAPHIC NAMES TRANSLITERATION SYSTEM

Block	Italic	Transliteration	Block	Italic	Transliteration
А а	<i>А а</i>	A, a	Р р	<i>Р р</i>	R, r
Б б	<i>Б б</i>	B, b	С с	<i>С с</i>	S, s
В в	<i>В в</i>	V, v	Т т	<i>Т т</i>	T, t
Г г	<i>Г г</i>	G, g	У у	<i>У у</i>	U, u
Д д	<i>Д д</i>	D, d	Ф ф	<i>Ф ф</i>	F, f
Е е	<i>Е е</i>	Ye, ye; E, e*	Х х	<i>Х х</i>	Kh, kh
Ж ж	<i>Ж ж</i>	Zh, zh	Ц ц	<i>Ц ц</i>	Ts, ts
З з	<i>З з</i>	Z, z	Ч ч	<i>Ч ч</i>	Ch, ch
И и	<i>И и</i>	I, i	Ш ш	<i>Ш ш</i>	Sh, sh
Я я	<i>Я я</i>	Y, y	Щ щ	<i>Щ щ</i>	Shch, shch
К к	<i>К к</i>	K, k	Ъ ъ	<i>Ъ ъ</i>	"
Л л	<i>Л л</i>	L, l	Ы ы	<i>Ы ы</i>	Y, y
М м	<i>М м</i>	M, m	Ь ь	<i>Ь ь</i>	'
Н н	<i>Н н</i>	N, n	Э э	<i>Э э</i>	E, e
О о	<i>О о</i>	O, o	Ю ю	<i>Ю ю</i>	Yu, yu
П п	<i>П п</i>	P, p	Я я	<i>Я я</i>	Ya, ya

* ye initially, after vowels, and after ъ, ь; e elsewhere.
 When written as ѣ in Russian, transliterate as yě or ě.
 The use of diacritical marks is preferred, but such marks
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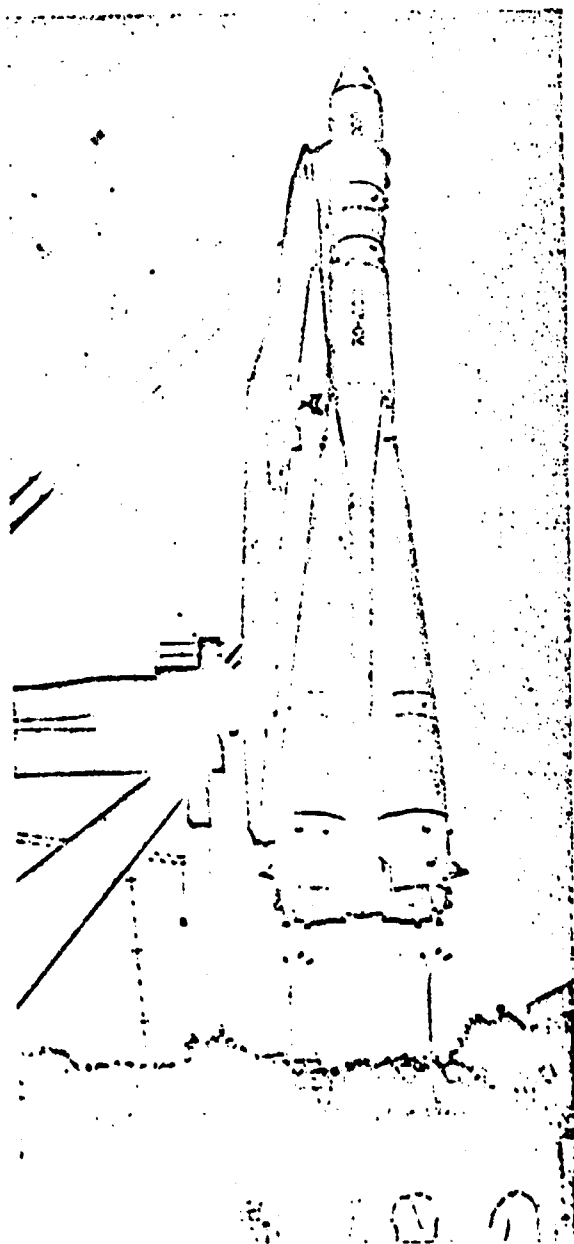
MORNING OF THE SPACE ERA

Yu. Pobedkonostsev, Honored Scientist and Technician
G. Nesterenko, Candidate of Technical Sciences

Next month workers of the Soviet Union, her sister socialist countries and all advanced peoples of the earth will celebrate the 50th anniversary of the Great October Socialist Revolution. Accomplished by the people of our country, under the leadership of Lenin's party, it was the beginning of the deliverance of humanity from a regime of exploitation, the beginning of the embodiment of ideas of scientific Communism in life. It had the deepest influence on all subsequent progress of world history.

With a sense of just pride every Soviet man looks back on his native land through fifty years. Under the wise leadership of the Communist Party, thanks to the selfless work of the people, a once backward country was turned into a socialist power with great industry and well-developed agriculture, advanced science, technology and culture.

Many remarkable victories have been gained by our country in the past fifty years. Many feats, delighting the whole world, have been achieved by our people in the glory of our native land, in the name of progress of all humanity. Among them an honorary place belongs to Soviet scientists, engineers, technicians, workers and pilots who established the beginning of the practical mastering of space. Ten years ago our country put into orbit the first artificial



"Vostok" rocket.

**GRAPHIC NOT
REPRODUCIBLE**

earth satellite in the world. This day, 4 October 1957, marks the birthday of cosmonautics, the day humanity began the conquest of outer space, the era of the extension of the human mind beyond the limits of its cradle - earth.

This feat of world value was due to the development of our country, the heroic efforts of all people, constructing a Socialist society under the leadership of the Party. It is due to the fact that the Communist Party throughout these 50 years has directed the development of science in our country. It is not accidental that

in our country state and public scientific research centers were created which worked on problems of rocket technology, and interplanetary flights. A study group on jet propulsion, created in the Thirties during the time of the Tsentral'nyy Sovet Osaviakhima, was, in particular, the first scientific center connected with the mastering of outer space not only in our country, but in the entire world.

From the first years of existence of Soviet power, science in the Socialist state became a state matter, the object of constant care of the Party and the people. Even in the most trying years of the country, the Soviet state did not spare the means for development of fundamental and applied directions of science.

The constant care of the Party and government about the development of science and thoughtful leadership of this development have inspired and continue to inspire Soviet scientists to selfless labor in the name of their native land, ensure an unparalleled rate of development of all branches of science and its enormous span. Now the Soviet Union has the very widest network of scientific establishments — more than 700,000 scientists. This is a fourth of total number of scientists in the world. "The achievements of our science have found a concentrated expression in the study and mastery of space. Our country laid the path to its investigation, started the first artificial earth satellite, carried out the first space manned flight" (Thesis of the Central Committee of the Communist Party of the Soviet Union "50 Years of the Great October Socialist Revolution").

The study and mastery of space has not only a purely cognitive, but also enormous practical value. The total results and prospects even now are difficult to foresee. Spaceships apparently in the near future will become a splendid means of transportation. The route from Moscow to New York, for example, including takeoff and landing will require one and a half to two hours. Spaceships can transport mail, packages, urgent goods. Already radio- and television communication, space "weather services," air and sea navigation, etc., are acting for the good of man.

The question about what gives to humanity on the whole the mastery of space can be compared with the question what gives individual man education, or value in the wide meaning of this word. Certainly, man can live without higher education. But if we ponder, it becomes clear that knowledge rising above the forces of nature, and mastery of these forces are the main things which make man the most surprising, the most complex and accomplished creation of nature, the very crown of learning matter. The mastery of outer space can be referred to one of the subjects of "the highest education of humanity." Already in a period of radical breaks in public relations, in an epoch of restoration of the economy of the country - destroyed to its foundations - in an epoch of construction of the national economy of a young Soviet Republic, the Communist Party, the Soviet Government and V. I. Lenin cared about the development of science. They gave it an important place in the construction of the new society. They directed and inspired scientists and inventors, supported them morally and materially in difficult times. And among the many the founder of astronautics Konstantin Eduardovich Tsiolkovsky found such support. In 1919 he was made a member of the Socialist (later Communist) academy, and in November, 1921, by resolution of the Council of People's Commissars he was granted a personal pension. This resolution of the government played a huge role in the life of the scientist not only because for the first time after many years of tense labor he could completely dedicate himself to scientific work, but also because in a period when many men of science and technology considered K. E. Tsiolkovsky only a dreamer, a handicraftsman working alone, his scientific work in the area of aeronautics, rocketry and astronautics obtained official acknowledgement.

The help and support of the Soviet Government were beneficially reflected on the creative activity of Tsiolkovsky. While in the first 64 years of his life (1857-1921) he published around 70 works, in the subsequent 14 years (1921-1935) Tsiolkovsky wrote and published 112 works.

In 1935 Tsiolkovsky wrote the Central Committee of the Party:

"My whole life I have dreamed of advancing humanity, however little, through my work. Prior to the revolution my dream could not have been realized.

"Only October brought acknowledgement to the work of a self-educated person..."

Konstantin Euardovich completed his letter with the words:

"All my work on aviation, rocketry and interplanetary communication I pass on to the Bolshevik Party and the Soviet Government — the true leaders of the progress of human culture. It is certain that they will successfully complete this work."

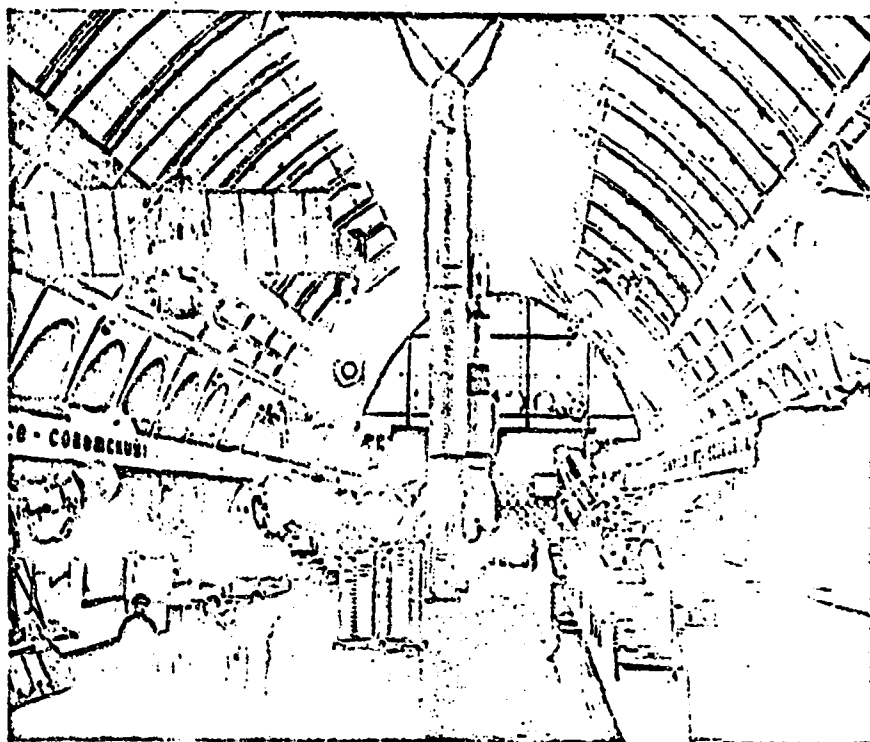
These words of the founder of astronautics turned out to be prophetic. The practical realization of all the basic ideas of Tsiolkovsky is proceeding successfully.

Here we need not enumerate again all steps passed on the path to the penetration of space by man: launching of the first satellites, flights of piloted ships, "Luniks," interplanetary stations. We will note only that the study and mastery of outer space by the Soviet Union are being conducted purposefully, according to a deep, well-thought-out plan. Space for scientific, national economic aims, for the benefit of humanity, for knowledge of the ever more concealed secrets of nature — this is the path along which our space studies are being carried out and developed.

A solution to these noble problems was the reason for the launching of the "Cosmos" automatic artificial earth satellites, the "Elektron" and "Lunik" satellites and the interplanetary stations of "Venus," "Mars," "Zond" type. The flights of piloted spaceships and the flights of courageous astronauts became commonplace, yet always deeply moving.

At first, 12 April 1961, there was only one person, only one revolution — the first and therefore a very responsible step into

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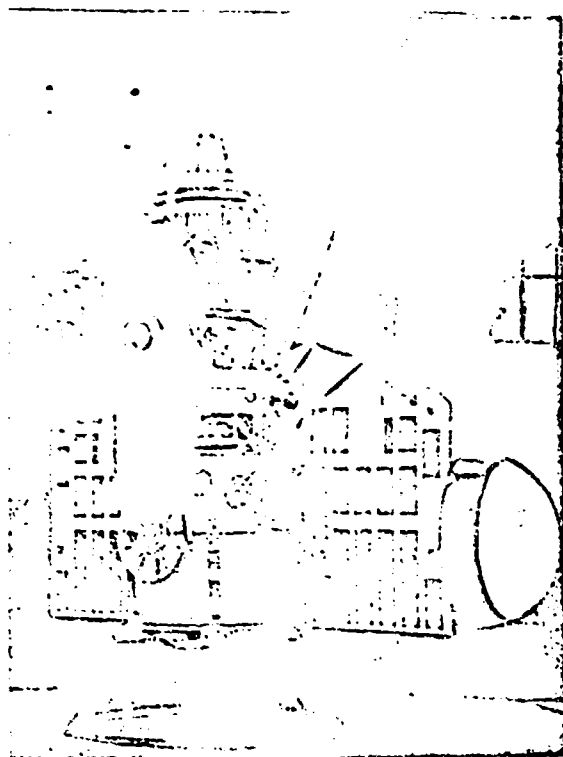


The "Cosmos" pavillion at the Exhibition of Achievements of the National Economy. Photo by B. Vdovenko.

the unknown — made by the Soviet astronaut Yuriy Gagarin. This day was made a holiday by the Soviet people — Interplanetary Navigation Day. Then came the first prolonged orbital flights: German Titov 6-7 August 1961; the group flights of Andriyan Nikolayev and Pavel Popovich — 11-15 August 1962; the first flight of a woman astronaut Valentina Tereshkova paired with the record holder in space flight length Valeriy Bykovskiy — 14-19 June 1963. All these flights were on spaceships of the "Vostok" series.

Then came a big, qualitatively new step in the study and mastery of outer space — the first flight of the multiseater spaceship "Voskhod" on 12-13 October 1964. On the "Voskhod," which can rightfully be called the first scientific space laboratory in the world, the courageous Soviet astronauts Vladimir Komarov, Konstantin Feoktistov and Boris Yegorov carried out an extraordinarily interesting program of investigations, important for future prolonged flights.

The "Voskhod" flight was extraordinarily important not only



The "Venus-3" space station.

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because in one ship there were three persons, but also because among them were professional scientists, and this is necessary for a more deep, comprehensive and thorough investigation of different scientific problems of the material world, and also the conditions of life and work of man in space. An important achievement gained from the multiseater "Voskhod" was that the crew of the spaceship for the first time could carry out a flight in ordinary clothes, and not in the bulky pressure suits which strongly constrained movement. In the cabin of the "Voskhod" astronauts were assured of all conveniences for work and rest.

Not figuratively, but actually did astronaut Aleksey Leonov step from the spaceship into free interplanetary space. He, together with Pavel Belyayev on the "Voskhod-2" considerably advanced the direct acquaintance of man with space. The historical flight of astronauts Belyayev and Leonov took place 18-19 March 1965. And, again, this new step into space was taken by the Soviet Union — our Soviet astronaut, Communist Aleksey Leonov. American astronauts then only repeated this experiment.

Leaving the ship and entering outer space is not only an interesting experiment for science, but also an experience which is necessary for future prolonged space flights. Floating in the boundless ocean of space, man must leave the ship and freely move and work in outer space to carry out observations and experiments, inspection and repair of external surfaces and systems of the ship.

It is necessary to note that in recent years there has been a noticeable change in composition and arrangement of the main problems of the mastery of space in significance and complexity of the solution. Now, as appeared in Space Astronautics in a special issue of July, 1966, biological problems have begun to prevail ever more over technical problems; problems of power engineering in space flight and the design of spaceships. The last decade gave such rapid and considerable progress in space technology that the limiting factors for further advance have become physiological and psychological, connected with the possibilities not so much of technology as of the actual person, his physical and, mainly physiological makeup.

Common ideas about space, gathered in the reading of science-fiction literature and propagandistic materials of the last decade, can be figuratively called "rhapsodical and heavenly." It does not quite correspond to reality. The people who directly and personally have touched space — designers, scientists, astronauts — know that the idea of flights into space is not just one of "unearthly" impressions and the fireworks of enthusiasm. First of all the idea of space flights means serious, responsible and very dangerous work and conditions which are sometimes unnatural for the human organism and therefore dangerous for life, such as vacuum, harmful radiation, weightlessness, etc.

Prolonged stay in the zero-gravity state, when there is neither top nor bottom, is not as pleasant as visionaries have said. Therefore weightlessness has now become the problem whose successful solution in considerable degree can determine prolonged space flights.

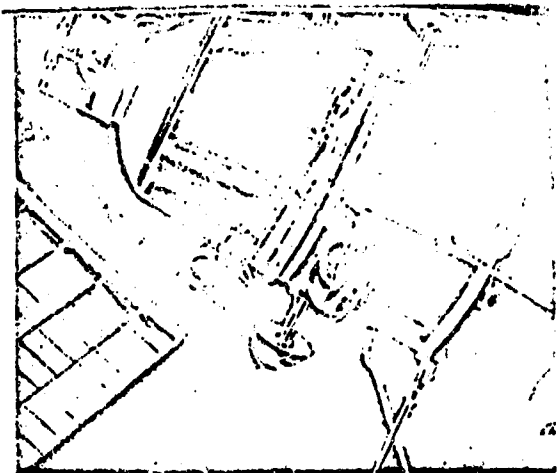
Both biologists and technicians are occupied with the problem of weightlessness. Technicians look for ways to create an "artificial

gravity," which, though not constant, is at least periodic and temporary, in order to give astronauts in flight "a rest from weightlessness." Biologists direct their efforts to a search for methods of adapting man to life under conditions of weightlessness.

One of the most prominent Soviet biologists, studying the problems of space, Professor V. V. Parin has said well: "Space, to say the very least, is a medium badly suited for life." The first woman astronaut, Valentina Nikolayeva Tereshkova, who has actually experienced not only all the gripping charms, but also all the difficulties of space flight, when asked in what way man would unaccustomed to space, expressed it more definitely: "In every way. Space has nothing for life. There is nothing to breathe. Everything man must have, he must take with him."

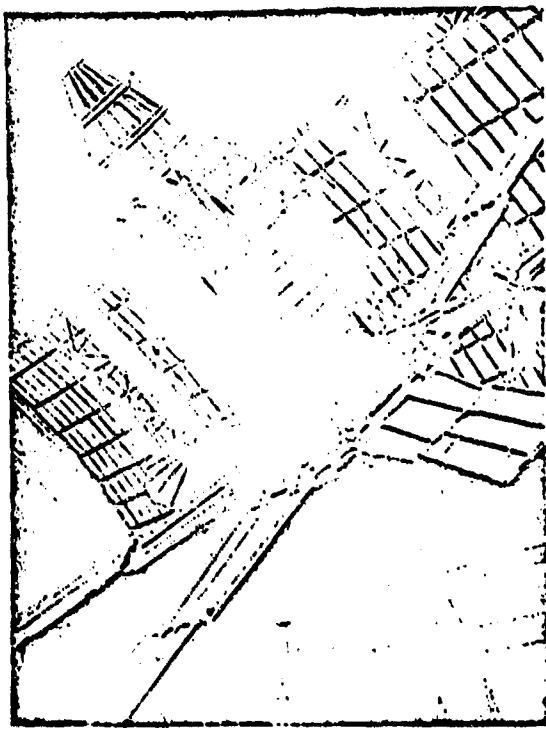
But he deeply errs who thinks that difficulties, hardships or even destruction in war can stop humanity, irresistibly rushing forward, along the way of progress. Accumulating experience, considering the lessons of the past and relying on new achievements of science and technology, the enthusiast for astronautics will go forward, to the new summits which still glitter so much in the tempting cosmic distances. Probably in no other area of contemporary science are these summits outlined so boldly and at the same time shining as fantastically and temptingly as in astronautics. A jaunt... to the moon with the light of the blue earth in the sky, landing on Mars and the solution of so many hypotheses and assumptions on the forms and history of life on this planet, journeys to other worlds...

The pursuits of scientists and technicians are infinite — as infinite as space itself. And, as it seems to us, even the immediate years of the space era — opened by our native land, the Soviet people — will undoubtedly be filled with moving events, planned achievements and discoveries. The history of science shows that, entering a new area, along with assumed results researchers as a rule obtain results sometimes utterly unexpected, sometimes more interesting and important for practice than those which they sought. Now it is difficult to anticipate how many discoveries significant for humanity



"Luna-10" space station.

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"Molniya-1" communications satellite.
Photo by B. Vdovenko.

can be made when peoples visit a planet of the solar system, for example, Mars, where an encounter not only with traces, but also with a Martian civilization and forms of life completely dissimilar to ours is not excluded.

This, true, is still a matter of the distant future. The mastering of outer space should be gradual and systematic, step by step. Next for mankind, as the foreign press stresses, is the

creation of large research laboratories able to stay in orbit an extended time, with a periodically replaced crew; circling the moon on a piloted spaceship, at first without a landing, and then with a landing on its surface.

Many problems in a study of the moon have already been carried out. Extensive work has been done by intelligent automatic instruments, and in learning to create them, man obtained possibility of sending them as advance scouts. Here we have the remarkable Soviet stations, circling the moon, photographing its reverse side, making a soft landing on its surface and making direct tests, observations and measurements necessary for different scientific aims. Here we have the American "Surveyor" stations, etc.

Where we live, in the Soviet Union, it is not accepted practice to advertise planned space launchings beforehand. Judging by the United States space programs, the moon can be circled rather soon. Landing of the first astronauts on the moon, using the "Apollo" space system, is intended for 1968-1969. The United States intends to fly around Mars without landing in September, 1975, and an expedition to Mars, with the landing of astronauts on its surface, is planned for the mid-1980's (1984-1985).

Naturally, life and ever-accelerating scientific and technical progress can introduce very significant corrections in these forecasts. Without doubt we will be witnesses to ever more significant and interesting steps of mankind into outer space.

This first decade has been only the morning of the space era. After it will follow the day - bright, filled with grandiose events. The Soviet Union, with its rapidly developing science will undoubtedly introduce its own contribution to the mastering of the infinite depths of space by mankind. For our space science and technology the most modern, the most reliable starting place is the mighty Socialist state, the advanced social system, ensuring blossoming of science and growth of talents of the people.